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## No. XLII.

## MEMOIR ON AMPHIBIA.\*

## S E R P E N T S.

Read, Feb. 1797. **O**F the various animals which merit the attention and researches of naturalists, serpents are not the least important, and the slight information and inaccurate ideas which we have of their manner of being, and of their habits, leave a rich and immense field for us to investigate.

Long convinced that many curious observations might be derived from a careful study of these animals, I have profited by the opportunities derived from a residence on this continent to employ myself on the subject. They have been one of the objects of my researches during a journey of about 2400 or 2500 miles made last summer in the southern parts of the United States, and among the Indians. I have even searched for these reptiles in their retreats during the winter ; that season which nature seems to have assigned to them for effecting a considerable change, might we not say a renewal, of several of their constituent parts.

The rattlesnakes (*crotalus* of Linnæus) appearing to me the most interesting, and offering the greatest number of curious phenomena (notwithstanding the dangers, too much exaggerated however, to which those who give themselves up to such investigations are exposed) will form the principal objects of this memoir.

Before

\* This memoir is part of a dissertation on amphibia in general, which I hope to publish after new observations which I propose to make.

Before I enter into the detail of my observations, it is necessary to present and discuss succinctly, what has been said and written on these animals, and to examine what we know concerning them.

The manner in which these amphibia attack the animals destined for their food is one of those problems in natural history which are yet to be resolved. The means they employ, as well as the real causes of many surprising effects, not yet well or unanimously stated, are unknown to us. According to some, the crotali and several other serpents have the faculty of enchanting and attracting birds, squirrels, rabbits, frogs, &c. (*aves sciurosq̃ue ex arboribus in fauces revocant.* Linn. Syst. Nat.) According to others they inspire them with terror, to such a degree, that if we can put faith in the effects related, we should be tempted to believe that they are from that moment deprived of their senses, and, as it were, attacked with insanity. According to others, in fine, these animals are violently affected and suffocated by a vapour, and fetid emanation, which the reptile diffuses upon every thing around it.

It is said that when the serpent wishes to seize a bird, a squirrel, &c. he remains motionless, his eyes constantly fixed upon his prey, and that then the unhappy victim, acted upon by a supernatural power, loses all its faculties, and cannot even have recourse to flight: it agitates itself, throwing out lamentable cries, goes, returns, advances, retreats, approaches, retires, comes and goes again, till at last exhausted by fatigue, it voluntarily delivers itself up to its enemy, who delays not to devour it. Such are the effects attributed to enchantment, terror, or the suffocating vapour which those serpents, it is said, have the power of casting round them, and which affects every animal which is found within its atmosphere. Let us examine these three pretended causes, and compare them with their supposed effects.

Admitting these effects, attested by so many persons, and by so many respectable authorities, effects of which I pretend not to deny the reality, but which I am likewise far from irrevocably adopting, it appears to me repugnant to reason to attribute them to enchantment, giving to that expression the full latitude which it presents to the imagination. We are no longer in that barbarous age in which men gave credit to enchantments, witchcraft, and miracles.

Reason which ought to be the sole guide of all men, reason, the best gift of the author of all things, and the peculiar attribute of man, has at length assumed the upper place and driven out that general fanaticism which formerly triumphed over unreflecting credulity. I do not pretend however to say, that we are yet enabled to explain every thing; there are facts, (and the subject of which I am treating is an example) whose causes we have not yet been able to discover. But the men of the present day are sufficiently enlightened to remain in suspense, and in such cases to reject every idea of the supernatural, fortilegeous, or miraculous.

If then the effects in question really exist, we may be allowed to believe that serpents, destined by nature (our common mother, always consistent with herself; always equally beneficent and just,) to subsist on animals which have the advantage of superior flight and speed, ought to be endowed with proper arms and a power by whose aid they may surprize and secure their prey. But what are these arms? What this power? Is it one of those secret operations which nature seems to envelope in impenetrable mystery? No. It is simply a fact till now unknown, merely because, 1st, These animals, whose pretended ugliness and danger have been so much exaggerated, instil into us a species of repugnance which few have the courage to overcome. 2d, Because few well-informed naturalists

ralists have had it in their power to observe them attentively, and for a length of time ; and because the greater number of naturalists have been contented with reporting the facts collected in their travels.\* 3d, Because the opportunities to make such observations are few, and require a long and particular attention, which few men are capable or willing to afford. 4th, Lastly, because these reptiles, in order to exercise with security this imputed power, must seek retired spots, in which birds, squirrels, &c. are not subject to alarm, and must be themselves at liberty to employ the means given them by nature to provide for their subsistence.

Let us add to these reflections a few facts which give them additional force. It is within the knowledge of the people of Philadelphia and of the United States at large, that Mr. Peale, whose establishment as well as zeal for the progress of natural history, is destined to produce in this country a taste for so interesting and useful a science,† has kept

\* The celebrated Catesby to whom we are indebted for so many observations and discoveries, more or less interesting, confesses, speaking of the boiquira (*crotalus horridus*. Linn.) that he never was an eye-witness of the pretended effects of the enchantment exercised by this reptile over birds, squirrels, &c. but that he is convinced of the facts. Might not the same be true of an observation related by him, and which upwards of twenty persons have confirmed to me in my travels, that if the serpent is killed while thus fixing an enchanted bird or squirrel, the charm ceases, and the animal delivered from the enchantment takes its flight. This observation, the strongest in favour of such an opinion, and attested by naturalists of reputation, appears to me to have much weight, but to require confirmation. Kalm has likewise pretended, that when the boiquira is taken and finds itself shut up, it refuses all kinds of nourishment. The observations to be related in this memoir will prove what degree of confidence is to be placed in such reports.

† Let me be allowed to avail myself of this opportunity of paying Mr. Peale the tribute which every lover of this beautiful and useful science owes to his zeal, his courage, and his constancy. Without other assistance than his love for the productions of nature, and his own industry, he has succeeded in forming a museum, already very interesting, and which will become more and more so daily. The Philosophical Society by accommodating him with

kept alive a boiquira for five years and a half. He has made on this animal, many observations, which, if not convincing, establish at least a doubt as to all the fables which have been imagined respecting this reptile.

\* Curious to inquire how this animal seizes his prey, he has confined several birds in the same cage with him, and the hungry reptile has made many attempts to take hold of the bird. This experiment has been repeated many times, and every time with the same effect. I have seen, myself, one of these birds in the cage, but whether the reptile was not hungry, or was sensible of its want of power, it remained perfectly tranquil, while the bird was perfectly at ease. It gave no indication which could make it believed that it was either enchanted or affrighted; and the air did not appear different, if we might judge by its behaviour, from that which it found in an ordinary close cage. The bird remained two days in the same situation, without the least attention paid to it by the reptile, who in the mean time eat a dead one which was presented to him.

Another living bird was put into the cage with the serpent: far from being alarmed, it amused itself with pecking in the bottom and picking up a few grains which it found there: often changing place in its accustomed manner, and even resting itself on the back of the boiquira, which made no extraordinary movements.—This experiment was made several times.

Mr.

with their building, have given a proof of the protection they afford to whatever may contribute to the progress of the sciences. May this example, well calculated to fix the attention of every good government, be copied by enlightened administrators, who following the governments of Europe, and principally that of France, may be sensible of the value of such an establishment, and the necessity of encouraging it for the good of the people.

\* The following experiments were all made in the summer, that is during the season in which these reptiles take their nourishment.

Mr. Peale, his children, and myself, have often examined the reptile. We never perceived it to send out the slightest suffocating odour. It is in vain to object that the living birds thus given it were not of the kind fitted for its nourishment; for it has eaten the same birds, when presented to it dead, and it is not useless to remark that it never refused one of them.

The same observation is not true of frogs, which, in the opinion of some persons, pass as the food of the boiquira; Mr. Peale often presented to it living and dead ones. It never touched them. It never in this respect imitated the black serpent (*coluber constrictus*. Linn.) This reptile, which Mr. Peale has likewise preserved alive, has eaten the flies, insects, and frogs (the *rana arborea*, Linn. among others) which were presented to it.

These experiments prove: 1st, That the boiquira, at least when it is in a state of captivity, has not the power of enchanting, affrighting, or suffocating *birds*. 2d, That it does not nourish itself with *frogs*.

The mistake, with respect to the nature of the food of this reptile, into which Linnæus and other naturalists after him have fallen, has been owing without doubt to there being two species of rattlesnakes; which he has confounded together.

There are within the territory of the United States two known species of *crotalus*. The *crotalus miliaris* and the *crotalus horridus* of Linnæus. There is however another, well distinguished by the inhabitants of the south. The *miliaris* is called the ground rattlesnake, and is so named because it keeps itself frequently under ground. When it comes to the surface it is most pleased in the grass, and is the more dangerous as it is difficult to be perceived. The second is known under the name of the pine-barren rattlesnake; and so named, because in the summer, that is, in the season that it quits its retreat and seeks its food, this  
reptile

reptile is found in those dry and arid lands which produce pines only. The third, a non-descript, and known by the name of the water rattlesnake, is larger than the former, is commonly confined to low grounds, and as it lives near the waters, might be presumed to make its food of frogs. Nevertheless I have assisted at the opening of many, (which had been killed for the sake of diminishing their number, and extracting the grease, of which an oil is prepared pretended to be of superior efficacy in rheumatic and other pains, but which in fact has no advantage over other unctuous substances) but I never found in their stomachs any thing besides birds, squirrels or rabbits. This new species, which is spoken of neither by Catesby nor Linnaeus, nor by any author with whom I am acquainted, appears to have been confounded with the *crotalus horridus*. It differs from it notwithstanding, essentially, both by its habits and external form. The *boiquira* is marked across the back by dark brown transversal lines, a little diagonal, terminated, on each side, by a spot almost round, of the same colour. The back of the other serpent is covered with parallelograms or lozenges of a browner colour than the rest of the body, and terminated by a yellow border. These differences may be readily observed in the annexed figures, Nos. 1 and 2.

After the discovery of this new species of serpent, I incline to think that the term *horridus*, which is equally applicable to both, ought no longer to subsist. I propose then to call No. 1. *crotalus boiquira*, a name by which it is generally known: and No. 2. *crotalus adamanteus*, after the form of the marks upon its back.

Some authors have further advanced that the *boiquira* was very active in the water and among rocks, but very slow and inactive in the dry land. This is an error, which no doubt owes its origin to the fearfulness of those who have fallen into it. Both these species are more tardy than  
other



other serpents (colubres). M. Bonnaterre in the introduction to his ophiology, expresses himself in a manner calculated to perpetuate this error, with respect to a reptile much less dangerous than is supposed. "Man himself," says he, "in spite of the dominion he possesses over all the animals," &c.

It is perfectly well known that the boiquira never attacks man unless he has been touched or affrighted. We may pass very near him without disturbing him, or his shewing the least disposition to bite. It has been said likewise, on as slight foundation, that he climbs into trees, and some naturalists have asserted with no greater degree of truth, that nature has provided this reptile with little bells or rattles, which make a noise as it moves along, to advise man of its approach. The rattles of these snakes make no noise while they creep along. When they are frightened or touched, instead of flying, they coil upon themselves, remain motionless and ready to dart forward. Then only they move with an inconceivable velocity, the rattles which advise us of their vicinity, and which they cannot agitate unless they are in a state of anger and contraction incompatible with the act of creeping.

With regard to the impression of terror and alarm which some consider as the source of the influence of serpents over certain animals, in addition to what I have remarked, it will be sufficient to compare the ordinary effects of fear with those which are said to be exhibited by birds, squirrels, &c. when fixed by a boiquira, to convince ourselves of the impossibility of such a cause.

Birds and squirrels have other enemies besides serpents. Man, dogs, cats, and many other animals shew them no higher favour. On the approach of these they fly, and no effect is discoverable similar to that which it is pretended they exhibit on the view of a serpent.

Well !

Well! perhaps the partisans of the third opinion will exclaim: this power, these arms which are not yet discovered, are neither terror nor enchantment, but a fetid emanation which the reptile casts around it, and which affects the animals which experience it to that degree that they become incapable of flight. The observations of Mr. Peale, already related, contradict this opinion. I shall oppose to it another and more recent fact.

Mr. Peale and myself had eight living rattlesnakes confined in a box of about eighteen inches square. We did not open it before the end of three or four weeks, when, after having taken them out in the presence of Dr. Deveze, a member of this society, one of the sons of Mr. Peale, and of two other persons, we examined the box with attention and did not perceive the slightest extraordinary smell.

I have seen in my excursions many serpents irritated, and ready to dart upon me.\* I never perceived that they emitted the slightest odour.

It results from what I have just said, that all which has been reported and written respecting serpents to the present time, is at least very dubious; that the study of these animals is, as it were, yet to be commenced: and that it offers to the naturalists who undertake it, the most interesting and curious

\* The *crotalus boiquira*, and *adamanteus*, the *mokasen*, which I call *agkikhodon mokasen*, the *coluber constrictor*, *getalus*, *ceftivus*, and *saunita* of Linnæus; the Coach-whip snake of Catesby—the corn snake of the same author—another very long one marked like the *boiquira* but unfurnished with rattles, and climbing trees—the serpent with a copper-coloured belly of Catesby: and several other non-descripts, to enumerate which would take up too much time. All these reptiles, upon touching them slightly with a stick, recoil upon themselves, raise their heads, and make a hissing while they open their wide mouths. One day I took in my hand a black snake, after having irritated and made it wild, it bit me on the lower joint of the fore-finger, two or three drops of blood issued from the wound, which very much alarmed my guide and several persons who were witnesses, in a few seconds the wound had dried up, and I felt no greater pain than if I had been only pricked by a pin.

curious observations and discoveries. I shall now proceed to detail my own observations, and those which I have made conjointly with Mr. Peale.

FIRST OBSERVATION.—Among the information which I endeavoured to obtain in my travels with respect to serpents in general, there was one point which greatly excited my curiosity. Several persons, and one among the rest,\* to whom I owe a debt of gratitude for civilities and marks of friendship, which will forever rest engraven on my heart, had informed me that the female rattlesnake concealed its young ones in its body. That when they were alarmed by any noise, or by the approach of man, they took refuge in the body of their mother, into which they entered by her mouth. This fact had been already ascertained with respect to the viper of Europe, but in consequence of the unfavourable and repulsive dispositions inspired by this kind of reptile, and in order to render it still more hideous, an absurd interpretation was given to this fact. It was pretended that this serpent eats its little ones after having given them birth. Curious to verify this fact, related of the boiquira, I was constantly occupied with this idea, and began to despair of ever making the observation, when at a moment in which I thought the least of it, accident furnished me the means. Having  
3 C 2 fallen

\* This estimable person is General Pickens. In a lamentable situation, and when my life was in danger among the Indians, I owed my safety to the strong recommendation which he gave to the Indian guide and interpreter, which he had procured for me, and to the letters which he had given me for different chiefs. His modesty will be perhaps affected by the liberty I take of naming him without his knowledge, but he will excuse this transport of my gratitude. This honest American, as much beloved by his fellow-citizens as by the Indians, whom he has frequently engaged and defeated in battle, knows how to confer obligations without affectation; to do good is in him a natural movement, so much the more to be praised, as among the greater part of men, it is the effect of interest, pride, or vanity.

fallen sick among the Indians, I found myself obliged to remain a few days with one of them in the neighbourhood of Pine Log. During my convalescence I took a walk every morning in the neighbourhood, and one day when I was following a pretty broad path, I perceived, at a distance, a serpent lying across the road in the sun. I had a stick in my hand, and drew near to kill it, but what was my surprize, when, in the moment that I was about to give the blow, the reptile perceived me, coiled upon itself, and opened its large mouth, into which five serpents, which I had not till then observed, because they were lying along its body, rushed into the gulph which I had conceived opened for myself. I retired to one side and hid myself behind a tree, the reptile had crawled a few paces, but hearing no further noise, and not perceiving me, stretched itself out afresh. In a quarter of an hour the young ones came out again. Satisfied with this observation I advanced anew towards the animal, with intention to kill it and examine the interior of its stomach: but it did not permit me to approach so near as it did the first time, the young ones entered with still greater precipitation into their retreat, and the boiquira fled into the grass. My satisfaction and astonishment were so great that I did not think of following it.

SECOND OBSERVATION.—On my return to Philadelphia, I recalled to Mr. Peale's recollection the project which we had formed the preceding winter, of going into Jersey to search for the boiquira in his retreats. He consented, and with the more readiness, as he had just lost the one which he had kept alive five years and a half. He in consequence wrote to Bridgetown to Dr. Elmer. On receiving an answer we started in the month of February; the season was already advanced, but not so as to render our expedition fruitless. Citizen Adet, minister of the French republic,

republic, a member of this society, and zealous in the pursuit of science, was to have been of our party, but was unfortunately prevented by illness. Arrived at Bridgetown we went forward to Morris River, in company with Dr. Elmer and Mr. White, who loaded us with kindness, and facilitated our researches by every means in their power. We were to have found at Morris River Captain Hawkins, who is perfectly acquainted with the retreats of these reptiles, and destroys them every year by hundreds.

The Captain not being yet arrived, we were conducted by an inhabitant to a place where he assured us he would shew us *boiquiras*. In the way he made us observe on the side of a rising ground on the banks of Morris River, excavations which had been made three weeks before, and in which had been found 75 of these reptiles entwined with each other. The hole was from three to four feet deep, and of about the same diameter. The way to the bottom of this hole is not straight.

I shall remark here, once for all, that *boiquiras* choose for their winter quarters two different situations. One on the south side of hills, and the other in low grounds, filled with roots, and covered with a thick cotton-like moss (*Sphagnum palustre*. Linn.). I have remarked, 1st, That the exposure was not always the same. 2d, That the way in was tortuous. 3d, The entrance was small enough to prevent the wind from penetrating with too much force. Captain Hawkins told me that he had never met with any of these reptiles in holes of which the entrance was larger than their bodies. 4th, In both these situations there is always found a running stream of spring water which never freezes at this depth, so that the *boiquiras* in their retreat are always near or over the water, but never in it.

Those naturalists who have advanced that these reptiles feed on frogs, and such like animals, will doubtless not fail to lay hold of this circumstance and interpret it in fa-

your

vous of their opinion. But facts are very convincing to the contrary. The boiquiras seek the sides of hills, and the low bottoms in which springs are found, in order to shelter themselves from the cold and frost which makes them perish. They are in these retreats only during the winter, that is to say, during the time that they are torpid and do not eat. In summer they always keep upon the heights, in the driest and most arid places. I made this remark during my travels, and the fact has been confirmed to me by Captain Hawkins and the inhabitants of New Jersey, in which state these animals are in abundance, and where accidents from them are frequent, the soil being generally dry, sandy and arid.

I return to my narrative. Being arrived at the place whither our guide wished to conduct us, we began, all of us, to dig where he pointed out. Our researches were fruitless. We hunted in three other places without success.

The next day Captain Hawkins, having arrived, conducted us four miles, into a low ground, at the foot of a small hill. It was covered with birch, dogwood, and other shrubs, and with a prodigious number of large trees fallen down and rotted, whose stumps were yet left. It is under these roots that the boiquiras retire. A layer of rich black earth, formed of the remains of vegetables, and two or three inches deep, was covered by a thick bed, about 5 or 6 inches high, of the sphagnum palustre, below this bed of earth were found, at small intervals, springs which ran through a loose miry soil into which a stick might be thrust easily five or six feet. It is in the neighbourhood of these springs, and above this miry soil, the reptiles are found which were the object of our investigation. Our first attempt was unsuccessful. Captain Hawkins opened however another cavity in which we found two boiquiras of moderate size. In two other places we found

found nothing. Captain Hawkins now conducted us about half a mile further to a low ground nearly similar, less covered with wood, but considerably loaded with sphagnum palustre, without which we should have sunk infallibly into the mud, so soft was the soil. The first search produced nothing; but the second made us ample amends for the pains we had given ourselves till that time. In the space of two hours, and in a spot of ground about 12 feet long and 8 or 9 wide, we took eight boiquiras of various sizes, which had each from two to nine rattles.

I had persuaded myself, after the different reports which I had heard, that I should find in the same cavities, and mingled with the boiquiras, many other species of serpents and even frogs. Having met with none, I inquired of Captain Hawkins if he had ever made the same observation. He answered it was not rare to find black snakes (*coluber constrictor*) mingled with the boiquiras; but he had never met with others, except once that he found in the same hole a young garter-snake (*coluber faurita*): as to frogs or toads he had sometimes met with them, but in small numbers, and very rarely.

We asked him whether he was acquainted with the retreat of other serpents, he answered in the negative, but supposed they passed their winters in holes at the foot of trees, on the heights. It would not be less important to discover and investigate the retreat of other reptiles: the true way to do it would be, it appears to me, to observe what holes are in the vicinity of the exuvixæ, which these animals cast off in the spring and autumn, and to seek them in such places during the winter.

THIRD OBSERVATION.—The cold was very moderate when we made this search, for about 10 o'clock the thermometer stood at 30° or 31° of Fahrenheit's scale: at noon we plunged it into the mud above which lay the boiquiras, where we left it ten minutes: it had risen to

43° when we took it out. At the time when we found seven serpents together in the same place, the sun had great power, the thermometer in the shade being above 40°. The serpents began to be sensible in this mild temperature: as we put them into the box which we had brought for this purpose they moved their rattles; but we did not perceive them to make any efforts to dart forward or bite.

After our return to Philadelphia, our boiquiras remained above three weeks in the same box, which, as I have already related, did not emit the slightest odour when we took them out of it.

FOURTH OBSERVATION.—At the end of this time we shifted them. I chose out one with rattles, which had been wounded by the blow of a stake in digging it out, and therefore could not live long, with the intention to make a few observations on the teeth of these reptiles. The season began to be very mild, the reptiles began to agitate their rattles; but unwilling to lose so favourable an opportunity, I seized the boiquira with great caution by my left hand, and holding it very near its head, so that by forcing its jaws forward I made its mouth open. I attempted with scissors in my right hand to dissect out the fleshy membrane or sheath which contains one of the fangs. I accidentally burst the bladder which held the venom, and two or three drops flowed upon my fingers. This liquor was of a clear and transparent yellow colour. After the operation, I took a small pair of flat pincers and drew the fang. At the moment I extracted it, five or six drops of poison came out with force, and flew to the distance of about two paces. I proceeded in the same manner to get the other fang, but made no venom fly out; and, less happy than in my first attempt, I brought away with it a portion of the jaw.

My



My intention was, 1st, To examine the teeth and fangs of these reptiles: 2d, To observe whether they would be reproduced, and in what space of time: but the animal dying of its wounds, or rather of the cold which came on two days afterwards, we shall not have it in our power to make this last observation.

FIFTH OBSERVATION.—I put into a small bottle, with water, the teeth of the boiquira, and carried them to Dr. Graffi, of our society, who, prevented by some patients under his care, had not been able to assist at our experiment, and we examined them together. I opened with attention the fleshy membrane which I had removed with the tooth, and we found eight teeth attached by a little fibre to a common membrane, as represented in Fig. 5. *These teeth* are destined to replace the old ones, which, according to all appearance, fall at least once every year.\*

SIXTH OBSERVATION.—Having remarked the prodigious quantity of young teeth in this fleshy membrane, I was curious to learn what is their arrangement while the animal is alive. Mr. Peale had been so kind as to prepare for me a young boiquira, one of those which we had taken, and which had died that day. I chose it for the subject of my experiment, it was almost dry, I loosened lightly, with a penknife, the fleshy and dried sheath which covered one of the fangs, and perceived three teeth of different sizes, placed one above the other in the manner described in Fig. 3. Not perceiving any more, I concluded that the small ones had been either removed with the fleshy part, or were so concealed as to render it impossible to discover them.

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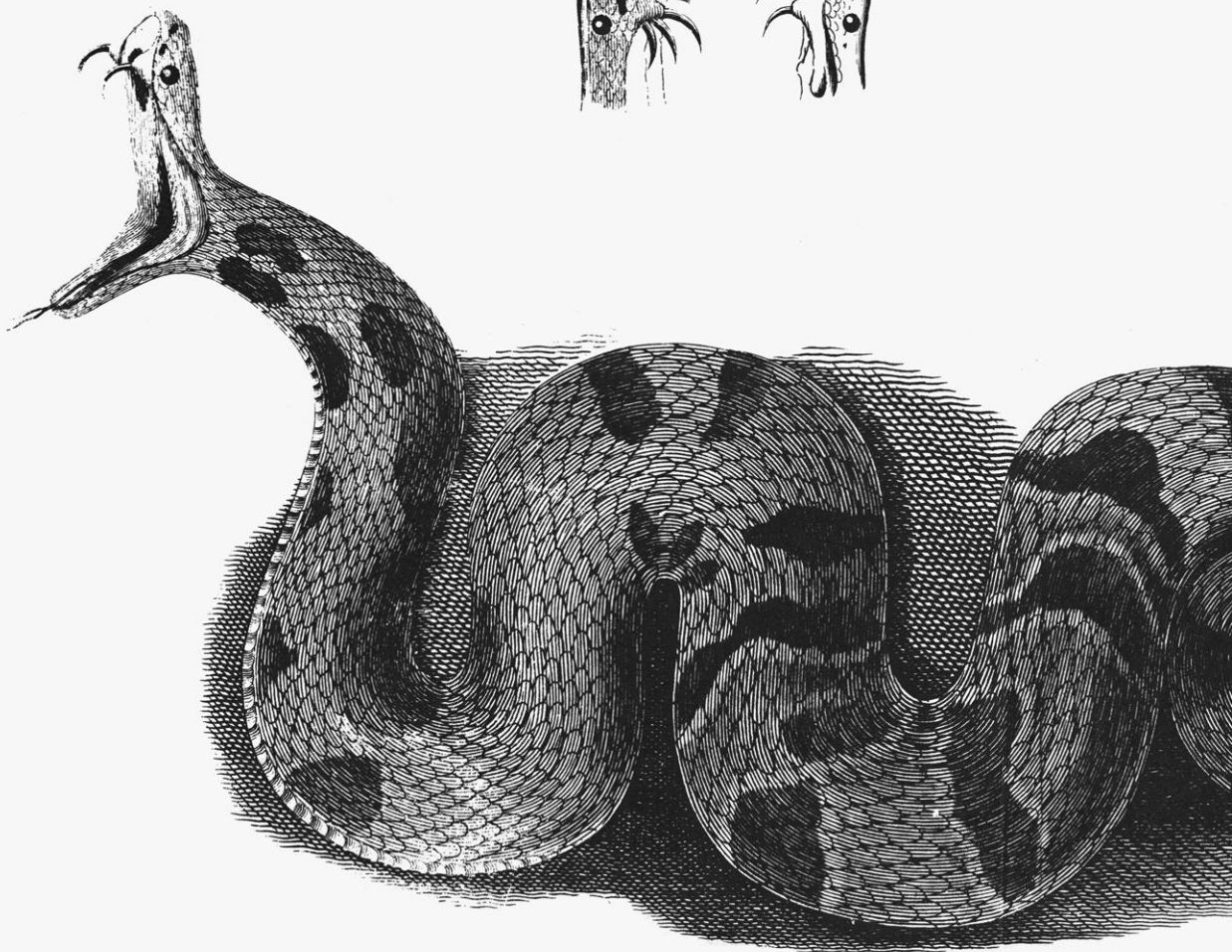
SEVENTH

\* This observation is not new. I have since found, in consequence of my researches, that this multiplicity of teeth had been already remarked in the European viper (*coluber natri* Linn.); and that John Bartram mentions the same fact in a Memoir on the Boiquira, printed in the Philosophical Transactions. Volume XLI. No. 456.

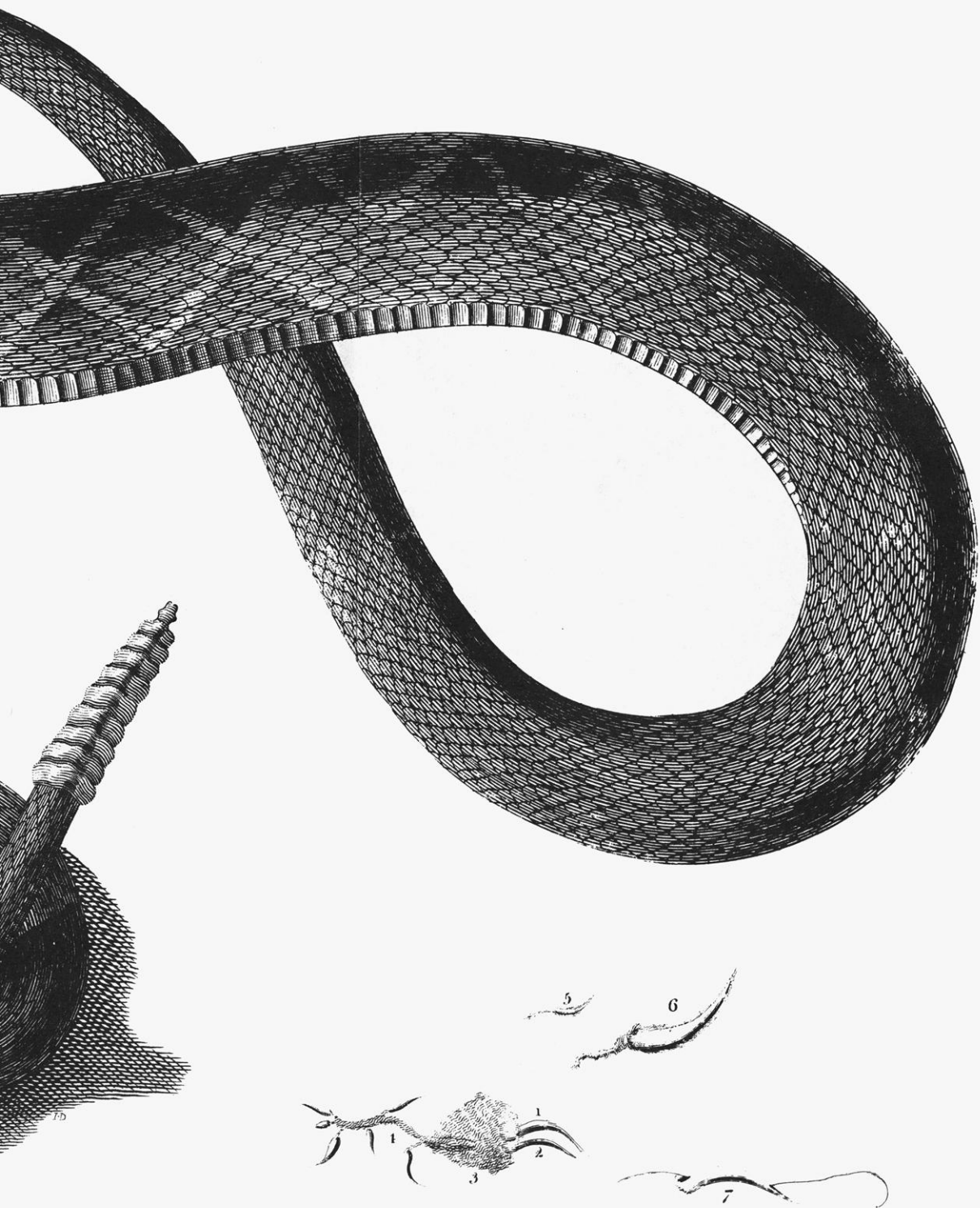
SEVENTH OBSERVATION.—The above observations led me to another fact which I was not looking for, which seems to me to explain the prodigious quantity of venomous matter of which I spoke in my first remarks. Beneath each fang, and towards the middle of the lower jaw, I find a bladder which has a communication with the root of the tooth. This bladder appears to be a reservoir of the poison, whence it is transmitted to the lower part of the tooth, in proportion as the animal pours it forth in the act of biting any object. Vid. Fig. 4.

EIGHTH OBSERVATION.—I do not offer this last observation as a new one. I am sensible that all the naturalists who have described the fangs of rattlesnakes and vipers, (for they have both the same conformation) have been perfectly acquainted with this species of tooth; but the description they give of it is so inaccurate, that I think myself obliged to rectify them. All the descriptions lead one to believe, that these teeth are hollow at the base, in their upper part, and at the extremity. They are in fact pierced at their base, and this opening communicates with, or rather is included in the bladder which contains the poison; but the hole which corresponds to this is always one or two lines, according to the size of the tooth below the point. It is as it were cut obliquely. The interior part of the tooth forms a species of channel which is prolonged on the outside from the second opening till near the extremity, as may be seen in Fig. 6. which represents a tooth through which a bristle has been passed.

I shall allow myself no reflections on these observations; but I think I have sufficiently demonstrated that we have almost every thing yet to learn relating to these extraordinary reptiles. Time, with repeated and multiplied observations, can alone afford us the information requisite to form a solid judgment on this subject: and I am persuaded we shall arrive at the proof, that the pretended effects of  
enchantment,







enchantment, terror, or a suffocating emanation, the produce of that unreflecting horror which these reptiles infuse into the greater part of mankind, are very natural phenomena, and of easy explication, as soon as observers and naturalists have learnt to shake off their prejudices, and will be bold enough, without rashness, to seek these animals in their retreats, at all seasons of the year, in order to observe them with coolness, and without prepossession.

We, Mr. Peale and myself, propose to make experiments upon the poison of the boiquira, and we shall submit them to the society when the facts and experiments have been sufficiently repeated and authenticated to establish some certain truths. I shall conclude this memoir by a few reflections on the systematical distribution of serpents.

Linnæus was of opinion that the teeth of serpents did not afford characters sufficiently marked to be the foundation of a systematical arrangement. He made use for this purpose of the plates or scales which cover their belly and the under part of their tail. M. de la Cépède, a successor worthy of Buffon, on account of his eloquence and his clearness, and still more worthy of eulogium on account of the respect which he pays to the most celebrated of naturalists, the immortal Linnæus, has followed the same plan.

M. de la Cépède distributes serpents into eight genera; namely, *Coulevres* (coluber) whose characteristics are large scales under the body, and two rows of small scales under the tail. *Boa* (boa) which have large scales under the body and tail likewise. The rattlesnakes *Boiquira* (crotalus) which have large scales under the body, and the tail in like manner, but are terminated by rattles, articulated the one into the other and giving out a noise.

The *Anguis* (anguis) which are wholly covered with imbricated scales.

The *Amphibenes* (amphisbænæ), whose body and tail are covered with circular scaly rings.

The *Cæciles* (cæciliæ), the scales of whose body are in folds.

The *Langaba* (langaha), which have large scales under the belly, annular scales near the anus, and very small scales under the tail.

Lastly, the *Acrochordes* (acrochordes), whose belly and tail are furnished with little tubercles.

After this distribution, it appears that the viper, atropos, ammodytes, and several which have fangs, and are poisonous, are confounded with the Coluburs, properly so called, which are not supplied with this species of teeth, and which are all harmless. It seems therefore natural to make a division of this genus already too numerous.

The genus boa offers another confusion which might be avoided. The greater part of serpents of this species are without teeth. There is moreover in America a non-descript serpent (the mokafon) which according to the scales under its belly and tail, ought to be arranged among the boas. This species however have not only teeth, but the extremities of their jaws are furnished with fangs like the boiquira.

For these reasons I think \* the genus coluber ought to be divided into

Vipers (*Vipera*), whose characters would be large plates or scales under the belly. Two rows of imbricated scales under the tail. The extremity of the upper jaw on each side furnished with a hollow fang or canine tooth. Venomous.

(Coluber)

\* There is another consideration in favour of this change. It is that all fanged serpents, at least all which I have had occasion to see, appear to me certainly viviparous: perhaps the colubres, properly so cited, are all oviparous. This is another fact relating to these reptiles very important to ascertain.

(Coluber). Large scales under the belly. Two rows of imbricated scales under the tail. All the teeth alike. No fang or canine tooth. Harmless.

(Boa). Large scales under the belly and tail. The tail without rattles. No teeth.

Cenchris. Large scales under the belly and tail. The tail without rattles. Small equal teeth.

Agkistrodon. Large scales under the belly and tail. No rattles. The extremity of the upper jaw furnished with two hollow fangs or canine teeth. Venomous.

In this last division should be arranged the mokafon.

I say nothing with respect to other genera, in which I have no alteration to propose.